Water Quality and Soils Evaluation Report

for the

Haster Basin and Recreational Field Project

Located in the City of Garden Grove
Orange County, California

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Glossary of Acronyms

bgs	below ground surface
BMP	best management practice
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CFU	coliform units
CHHSL	California Human Health Screening Levels
COC	chain of custody
CTR	California Toxics Rule
CWA	Clean Water Act
DAMP	Drainage Area Management Plan
EC	electrical conductivity
Eco-SSL	Ecological Screening Level
EPA	Environmental Protection Agency
ft^2	square feet
ft^3	cubic feet
gpm	gallons per minute
HASP	health and safety plan
hr	hour
LIP	Local Implementation Plan
µg/g	micrograms per gram
µg/L	micrograms per liter
mg/Kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliter
MPN	most probable number
ng/g	nanograms per gram
OCFCD	Orange County Flood Control District
OPP	organophosphorus pesticide
pcf	pounds per cubic foot
NPDES	National Pollutant Discharge Elimination System
PAH	polynuclear aromatic hydrocarbon
PCBs	polychlorinated biphenyl
RCB	reinforced concrete box
RCP	reinforced concrete pipe
RSL	Regional Screening Level
RWQCB	Regional Water Quality Control Board
SVOC	semi-volatile organic compound
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TSS	total suspended solids
VOC	volatile organic compound

1.0 Introduction

This report presents the results of the water quality sampling for Haster Basin (Basin) and geotechnical sampling and evaluations of the soils located on the island in the Basin. Geotechnical and soil sampling was conducted to determine the suitability of the soil as fill material for the proposed recreational area included in the Haster Basin and Recreational Field Project (project). The report includes an evaluation of available water quality and soil analytical data, a review of water quality regulations, and the results of the soil investigation.

1.1 Site Background

The Basin (Orange County Flood Control District [OCFCD] Facility C05B01) is a retarding basin located near the intersection of Lampson Avenue and Haster Street, in the City of Garden Grove, California. The Basin is owned and operated by the OCFCD, and is a part of the Twin Lakes Freedom Park, which is operated by the City of Garden Grove. The total area of the Park is approximately 22.4 acres. The Basin receives stormwater runoff from a 1,845-acre drainage area, which extends north to Vermont Avenue in the City of Anaheim; east to State College Boulevard in the Cities of Orange and Anaheim; and west to Harbor Boulevard in the Cities of Anaheim and Garden Grove. The drainage area is bisected by the Santa Ana Freeway (Interstate 5). Land use to the west of the freeway is predominantly residential, while land use east of the freeway is predominantly industrial and commercial.

Contiguous with the County property are areas owned by the City of Garden Grove which are used as part of Twin Lakes Park. These areas are as follows:

- A 0.4-acre parcel located in the northwest corner of the site. The area includes picnic table facilities for park users.
- A 0.8-acre parcel located between the east County property line and Haster Street. A children’s play area, and City of Garden Grove domestic water well are situated on this property.
- A 1700-square foot parcel located in the southwest corner of the site, in an area notched out of the homeowner’s lot at 12731 Aspenwood Lane. An abandoned City-owned well, which was used at one time to fill the lake and irrigate the park, is installed on this land.

The park has become an important asset to the City of Garden Grove, as it is one of only a few recreational areas located in the eastern section of the City. It offers a tranquil setting for picnicking, jogging, and bicycling, and is heavily used year-round.

The existing flood control facilities were designed in the early 1960s to convey 65 percent of the 25-year peak discharge, in accordance with the hydrology standards of the time. The County’s current hydrology manual, adopted in 1986, requires 100-year return frequency flood protection for all habitable structures. Facilities which do not meet the 100-year flood protection requirement are considered substandard and are programmed by the County for improvement. The Basin’s existing capacity is approximately equivalent to a 5-year storm.

Influent flow is stored in the Basin up to an elevation of 103.3 feet, before it discharges into the downstream extension of the East Garden Grove-Wintersburg Channel with an original design capacity of 360 cubic feet per second (cfs). When the water level rises above elevation 103.3 feet, it flows out of the Basin by gravity flow into the East Garden Grove-Wintersburg Channel. The normal water surface elevation of the Basin is approximately 100 feet. All dry weather flow captured by the Basin is lost either through evaporation or infiltration.

The purpose of the Basin is to attenuate peak flows from the upstream drainage area by storing water in excess of the downstream channel capacity. Two regional drains discharge directly to the Basin. The East Garden Grove-Wintersburg Channel (OCFCD Facility C05) was constructed in 1964. This facility is a 9-foot by 6-foot reinforced concrete double box culvert which enters the Basin at its northeast corner at an invert elevation of 96.11 feet. The 100-year expected flow tributary to this facility is 2,000 cfs. The facility extends upstream of the Basin to Chapman Avenue, where it terminates at the outlet of the Holiday Storm Drain (OCFCD Facility C05P22) and the Spinnaker Storm Drain (OCFCD Facility C05P21).

The Oertley Storm Drain (OCFCD Facility C05 P19) was constructed in 1968. This facility is a 96-inch reinforced concrete pipe (RCP) which enters the northwestern portion of the Basin at an invert elevation of 96.17 feet. The 100-year expected value flow tributary to this facility is 400 cfs. The area tributary to the Oertley system is 625 acres of primarily residential land use. Its alignment is located north between Heather Avenue, Sungrove Circle, and Oertley Drive, terminating in Chapman Avenue at Somerset Place, where it joins a City of Anaheim storm drain.

Also contributing flow to the Basin is a City of Garden Grove domestic water well, located on Haster Street, in the upper lake area of the park. According to the the City of Garden Grove, the well has a variable capacity of 2,500 to 4,500 gallons per minute and discharges approximately 22,000 gallons to the Basin during its waste cycle (Bermudez). The waste cycle is fifteen minutes in duration and occurs each time the well is started. The well is operated most of the year and produces between 2,500 and 6,500 acre feet of domestic water per year.

Water discharges from the Basin through the downstream continuation of the East Garden Grove-Wintersburg Channel, located in the southwest corner of the site. The discharge outlet is a 30-foot-long by 10-foot-wide by 5.5-foot high reinforced concrete box culvert with a reported design capacity of 400 cfs, which transitions to a 10-foot-wide reinforced concrete rectangular channel. The invert elevations of the culvert at the Basin outlet, and at its downstream end are 103.92 feet and 103.84 feet, respectively.

The rectangular channel extends approximately 135 feet southerly to Aspenwood Lane with a grade line slope of 0.00378. The top of the rectangular channel walls extend anywhere between 2 inches and 30 inches above the surrounding pavement, and are about 8 feet above the channel invert. There are two 18-inch-high by 18-inch-wide openings in the wall at the pavement grade to collect surface drainage. An iron grate (4-inch bar spacing) is located over the inlet to the culvert (outlet of the Basin) to block large pieces of debris from flowing downstream.

The Aspenwood Lane crossing is a 70.34-foot-long by 10-foot-wide by 4-foot-high reinforced concrete box (RCB) with a slope of 0.00384. It is this location which controls the maximum outflow from the Basin. This flow is identified as between 400 cfs and 450 cfs in the 1994 project report.

Downstream of Aspenwood Lane, there is a 15-foot-long transition to an 11-foot-wide by 6-foot-high RCB. This transition and 751.44 feet of an 11-foot-wide by 6-foot-high RCP were constructed in 1978 and replaced the original reinforced concrete trapezoidal channel. During this construction, the grade line of the channel was lowered by 6 inches at the beginning of the transition section, which resulted in reducing the slope from 0.0022 to 0.0015. The 11-foot-wide by 6-foot-high RCB continues to the north side of Garden Grove Boulevard at a slope of 0.0022. It then transitions in 30 feet (transition slope of 0.0180) to a 10-foot-wide by 5.5-foot-high RCB, which extends 102.28 feet southerly at a slope of 0.0033 beneath Garden Grove Boulevard. The channel transitions in 30 feet to a reinforced concrete trapezoidal channel with a base width of 6 feet, and side slopes of 1.5:1. The trapezoidal channel extends 1085.69 feet southerly to the north side of Garden Grove Freeway at a slope of 0.00248.

The crossing of the Garden Grove Freeway was recently modified to accommodate the expected 100-year runoff flow. The project included one 84-inch reinforced concrete pipe (RCP) on each side of the existing 12-foot-wide by 6-foot-high RCB, and transitions to the existing trapezoidal section on the downstream side. On the north side (upstream) of the freeway, the modification consisted of a transition from the existing trapezoidal section to a double 10-foot-wide by 10-foot high RCB, then to the headwall of the freeway crossing, where the new Lewis Storm Channel confluences with the East Garden Grove-Wintersburg Channel.

Between Garden Grove Freeway and Harbor Boulevard, the East Garden Grove-Wintersburg Channel is a reinforced concrete trapezoidal channel with a base width of 6 feet and side slopes of 1.5:1. The grade line slopes are 0.0103 to 0.00235 between the Garden Grove Freeway and Pearce Street; 0.00285 between Pearce Street and Trask Avenue; and 0.00232 to 0.00230 between Trask Avenue and Harbor Boulevard. The crossings of the Garden Grove Freeway, Pearce Street, Trask Avenue, and Harbor Boulevard are a 12-foot-wide by 6-foot-high RCB, a 12-foot-wide by 5-foot-high RCB, a 12-foot-wide by 6.5-foot-high RCB, and a 12-foot wide by 6.5-foot high RCB, respectively.

Downstream of Harbor Boulevard, it is generally an open trapezoidal channel of varying base widths, side slopes, and materials to its outlet into Bolsa Bay and Huntington Harbor, located just south of Warner Avenue (AKM, 2008).

2.0 Soil Investigation

A chemical investigation was also requested by the County to determine the potential for chemical contamination in the soil comprising the island in the Basin, and whether it may potentially cause harm to human health or the environment in its proposed use as fill for the recreation area. A geotechnical investigation was requested by the County to determine the geotechnical suitability of the soil comprising the island for use as fill for the proposed recreation area in the northeast area of the Basin.

Prior to initiating field activities, a Health and Safety Plan (HASP) was prepared which identified potential hazards associated with the field activities. All field personnel read and signed the HASP prior to performing work at the site. A copy of the HASP was kept on-site throughout the duration of the work. Underground utility clearance was also performed prior to field work by notifying USA Dig Alert.

2.1 Data Review

2.1.1 Review of Soil Chemical Data

A soil investigation was previously performed at the site in January 2009. The County provided soil laboratory results of chemical analyses performed on ten samples collected from the perimeter of the Basin during the 2009 investigation. These samples were labeled HB01 through HB10. The samples were analyzed for total organic carbon (TOC), metals, acid extractable compounds, aroclor polychlorinated biphenyls (PCBs), base/neutral extractable compounds, chlorinated pesticides, organophosphorus pesticides (OPPs), PCB congeners, polynuclear aromatic hydrocarbons (PAHs), pyrethroids, triazines, acrolein, acrylonitrile, chlorinated herbicides, and volatile organic compounds (VOCs).

The laboratory results indicate that metals, including mercury, acid extractable compounds, and PAHs were detected in all ten samples. Base/neutral extractable compounds were detected in samples HB02, HB05 and HB08. Chlorinated pesticides were detected in samples HB01 through HB06 and HB08. PCB congeners were detected in samples HB01 and HB04. A summary of analytes that exceeded California Environmental Protection Agency (EPA) Region IX Human Health Screening Levels (CHHSLs) is provided below.

- Arsenic exceeded the EPA Region IX CHHSL (Cal/EPA, 2005) of 0.07 micrograms per gram (µg/g) in ten samples (HB01 through HB10). Arsenic concentrations ranged between 0.568 µg/g and 3.003 µg/g.
- The lead concentration in sample HB01 of 162.1 µg/g exceeded the CHHSL of 150 µg/g.
- Benzo(a)pyrene exceeded the CHHSL of 38 nanograms per gram (ng/g) in samples HB01, HB02, and HB04. Benzo(a)pyrene concentrations in these three samples ranged from 46.3 ng/g to 95.9 ng/g.
- The Dibenz(a,h)anthracene concentration of 18.1 ng/g in sample HB01 exceeded the CHHSL of 15 ng/g.

Based on information provided by the County, the location of the sample corresponding to identification number WR148051 was unable to be determined. A summary of analytes that exceeded CHHSLs, Regional Screening Levels (RSLs) and Ecological Screening Levels (Eco-SSLs) in this sample are summarized below:

- The aldrin result of 111 ng/g exceeded the CHSSL criteria of 33 ng/g.
- The dieldrin result of 147.3 ng/g exceeded the CHSSL criteria of 35 ng/g; and Eco-SSL for birds of 22 ng/g, and mammals of 4.9 ng/g.
- The heptachlor result of 224.6 ng/g exceeded the CHSSL criteria of 130 ng/g.
- The heptachlor epoxide result of 72.4 ng/g exceeded the RSL criteria of 53 ng/g.
- The dibenz(a,h)anthracene result of 35.2 ng/g exceeded the RSL criteria of 15 ng/g.
- The benz(a)anthracene result of 2251.9 ng/g exceeded the RSL criteria of 150 ng/g.
- The benzo(a)pyrene result of 2452.7 ng/g exceeded the CHSSL criteria of 38 ng/g.
- The benzo(b)fluoranthene result of 2488.3 ng/g exceeded the RSL criteria of 150 ng/g.
- The benzo(k)fluoranthene result of 3320.8 ng/g exceeded the RSL criteria of 1,500 ng/g.
- The total PAH result of 35773.3 ng/g exceeded the Eco-SSL criteria for soil invertebrates of 18000 ng/g and mammals of 1100 ng/g.

These potential impacts to human health and wildlife can be mitigated by placing a minimum of 24 inches of clean fill above the soil removed from the Basin and used as fill beneath the recreation area. In addition, it is recommended that the soils removed from the Basin and used as fill beneath the soccer fields are placed above the groundwater elevation to prevent potential leaching of pollutants.

2.1.2 Review of Soils Geotechnical Data

A geotechnical investigation was performed at the site in July 2005. The purpose of the geotechnical investigation was to determine the suitability of the site for the planned construction, excavation and compaction requirements, slope stability analysis, and pump station design recommendations. A total of four borings were drilled around the perimeter of the Basin during this investigation; in addition to two groundwater monitoring wells installed in May 2004. The borings were drilled to a depth of approximately 30 feet below ground surface (bgs). The soil encountered in the borings was mostly poorly graded silty sands. Groundwater was encountered in each boring, ranging in depth between 14 and 17 feet bgs. No borings were drilled on the island located in the middle of the Basin.

2.2 Site Visit

AECOM inspected the site on January 12, 2010 to observe existing water level conditions, the location of the proposed pump station, recreation area and parking lot, existing inflow and outfall conditions, existing flora and fauna, and existing water quality. A second site visit was performed on January 22, 2010 to observe conditions at the Basin during a large rainfall event.

It was noted that a number of birds, ducks and geese were occupying the area and contributing a large amount of fecal matter in the Basin. Small continuous air bubbles were observed without any sign of a duck/bird surfacing, thereby suggesting that turtles may be present in the Basin. It is common for small domestic turtles and other aquatic animals to be released into local water bodies. Trash was visible on the shoreline and in the shallow water of the Basin, and an oily film was observed in several places along the shoreline.

2.3 Soils Chemical Investigation

AECOM conducted soil sampling on January 13, 2010 to obtain information on the chemical concentrations in the soil comprising the island within the Basin. The chemical analyses were selected based on the previous investigation performed in January 2009, and based on likely constituents in urban stormwater runoff. A total of four samples were collected from 0.5 to 1.0 feet bgs and 3.0 to 3.5 feet bgs, from two borehole locations on the island (B-1 and B-3), as shown in Figure 2.1. An additional borehole location (B-2) was augered to collect samples, however, these were not analyzed due to similarity to the samples collected from the other locations.

Due to local groundwater being encountered at approximately 5 feet bgs, the boreholes collapsed at this depth from the high moisture content and samples could not be collected at 10 feet bgs. The samples were analyzed for metals, PAHs, chlorinated herbicides, asbestos, OPPs, total petroleum hydrocarbons (TPHs), VOCs, semi-volatile organic compounds (SVOCs), PCBs, and chlorinated pesticides.

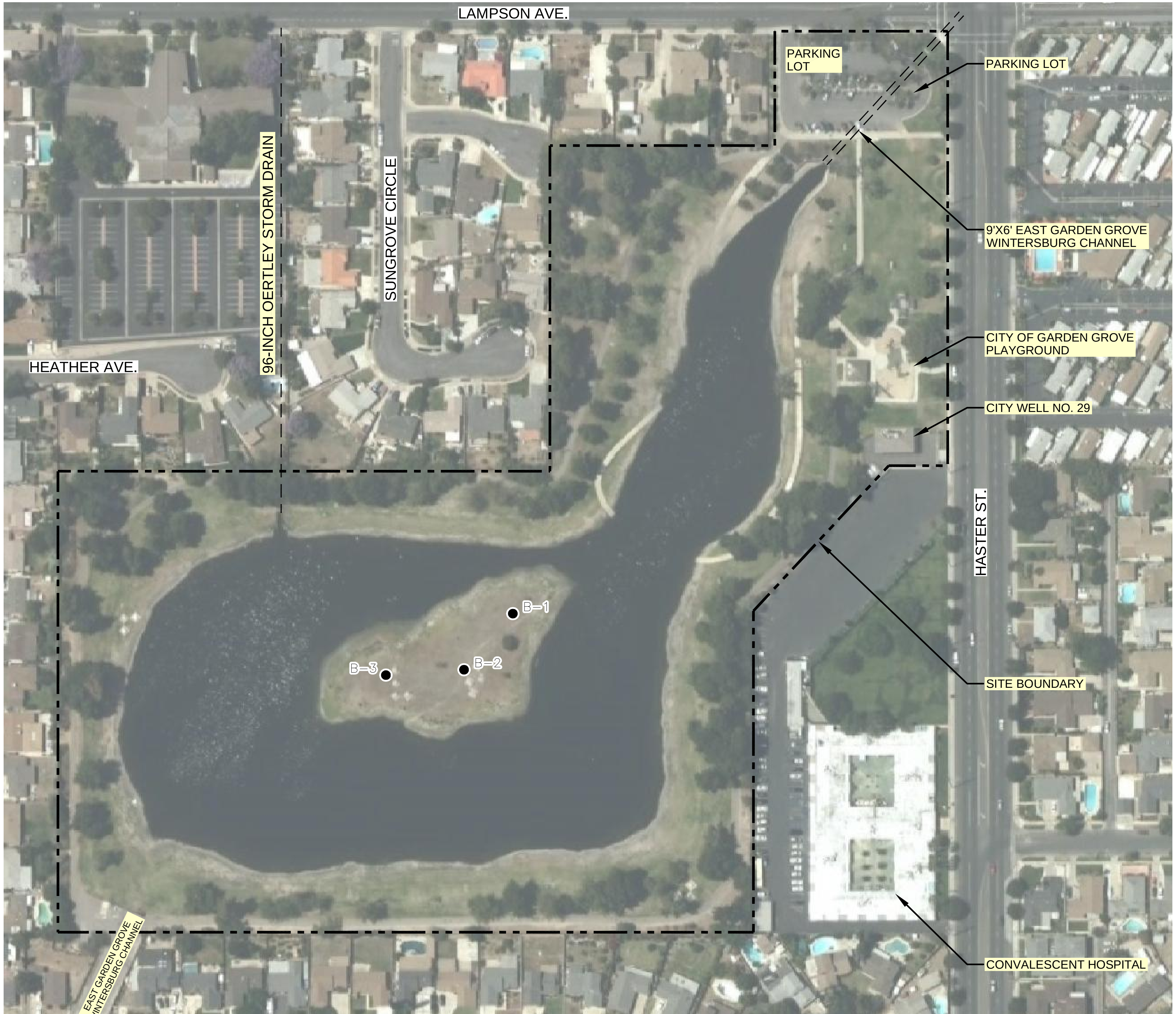
The soil samples were collected using a hand auger, and the samples were placed in glass jars supplied by the laboratory, using disposable nitrile gloves. Decontamination procedures were followed for all equipment that came in contact with the soil. Reusable equipment was decontaminated with an Alconox solution, rinsed with tap water, and then distilled water. New disposable nitrile gloves were used to collect each separate sample, thereby preventing cross contamination.

The samples were labeled with unique identifiers indicating the location and depth of each sample, company name, and date. Samples were placed on ice in a cooler until delivered to the laboratory under chain of custody (COC) documentation. The laboratory is certified under the Environmental Laboratory Accreditation Program.

2.3.1 Soil Chemical Investigation Laboratory Results

United States (US) EPA regulatory guidance and screening levels were used to compare against the results for identifying potential risks to human health in a residential land use setting, which is considered to be most applicable to the proposed park use. However, these may be considered to be overly conservative for the proposed use. The EPA Region IX CHHSLs (Cal/EPA, 2005) were used. If the CHHSLs were not available, the United Sates Environmental Protection Agency (USEPA) RSLs (USEPA, 2009) were used. The USEPA Eco-SSLs (USEPA, 2005) were also used to compare against the results for identifying potential risks to plants, invertebrates, birds, and mammals.

The soil sample analytical results and a copy of the laboratory analytical report for the chemical investigation are provided in Appendix A. The results show that all analytes were very low and were below the respective CHHSLs for a residential land use (where available). However, the samples marginally exceeded the Eco-SSLs for ecosystem protection, for lead, vanadium, and zinc with respect to avian and mammalian wildlife. A summary of analytes that exceeded Eco-SSLs is provided in Table 2.1 below.



LEGEND

● B–1 SOIL BORING LOCATION

— · — SITE BOUNDARY

N

75 0 150

1"=150'

SOURCE: GOOGLE EARTH 2008

AECOM

HASTER BASIN STORMWATER QUALITY EVALUATION

GARDEN GROVE, CALIFORNIA

SOIL BORING LOCATIONS

DATE: 1/28/10	DRWN: SM/RM	CKD: MM	PROJ#: 60144963	FIGURE 2.1

Table 2.1. Analytes Exceeding USEPA Soil Eco-SSLS

Boring Number:	B1	B1	B3	B3	**USEPA ECO-SSLs(3)**
Sample Depth Interval (Feet):	0.5-1.0	3.0-3.5	0.5-1.0	3.0-3.5	
Sample ID:	B1C0.5-011310 (0.5')	B1C3-011310 (3.0')	B3C0.5-011310 (0.5')	B3C3-011310 (3.0')	
Sample Date:	1/13/10	1/13/10	1/13/10	1/13/10	
ANALYTE					
Lead (mg/Kg)	**38**	**15**	3.3	1.8	120^{P}, 1700^{I}, 11^{A}, 56^{M}
Vanadium (mg/Kg)	**18**	**13**	**23**	**15**	7.8^{A}, 280^{M}
Zinc (mg/Kg)	**130**	25	36	21	160^{P}, 120^{I}, 46^{A}, 79^{M}

Source: AECOM, 2010.
Notes:
All analyte concentrations are in milligrams per kilogram (mg/Kg)

38	Result Exceeds One or More of the USEPA Soil Ecological Screening Levels
P	Plants
I	Soil Invertebrates
A	Avian
M	Mammalian

2.4 Geotechnical Investigation

Three borings were manually advanced with a hand auger on the island in the Basin on January 13, 2010, as shown in Figure 2.1. These borings were augered immediately adjacent to the boreholes for the chemical investigation, and were also labeled B-1, B-2 and B-3. Each boring was advanced to groundwater, which was encountered at 5 feet bgs in all three borings. A bulk sample was collected from 1 foot bgs to 5 feet bgs in each boring. A total of two bulk samples were sent to the laboratory for analysis, B-1G-2.5-011310 and B-3G-2.5-011310. The sample collected from B-2 was not analyzed due to similarity to the other two samples collected. Each sample was tested for grain size analysis (ASTM Method D422), compaction characteristics (ASTM Method D1557), expansion index (ASTM D4829), and moisture content (ASTM D2216). These testing methods were chosen to assess the potential of the existing soil to be used as engineered fill for the proposed soccer fields. The samples were sent to the laboratory under COC documentation.

2.4.1 Geotechnical Laboratory Results

The geotechnical laboratory results are summarized in Table 2.2. The geotechnical laboratory reports are provided in Appendix B. Both samples that were submitted for testing, B-1G-2.5-011310 and B-3G-2.5-011310, had similar grain size profiles with 100 percent passing the 1-inch sieve and 23 and 21 percent passing the #200 sieve, respectively. Both samples were characterized as a silty sand using the Unified Soil Classification System. The initial moisture content of the samples submitted to the laboratory was 12.7 percent for B-1G-2.5-011310 and 14.6 percent for B-3G-2.5-011310. The maximum dry density for B-1G-2.5-011310 was 131 pounds per cubic foot (pcf) at an optimum moisture content of 8.5 percent, and the maximum dry density of B-3G-2.5-011310 was 125.5-pcf at an optimum moisture content of 10 percent. The expansion index for both samples, B-1G-2.5-011310 and B-3G-2.5-011310, was in the very low range, with values of 2 and 3, respectively.

Table 2.2. Geotechnical Laboratory Results

Results		Sample ID	
		B-1G-2.5-011310	B-3G-2.5-011310
USCS Classification		SM	SM
Maximum Dry Density (pcf)		131.0	125.5
Optimum Moisture Content (%)		8.5	10.0
Expansion Index		2	3
Initial Moisture Content (%)		12.7	14.6
Grain Size	1-in	100	100
	3/4-in	99	100
	1/2-in	99	100
	3/8-in	99	100
	# 4	97	98
	# 10	91	95
	# 16	83	89
	# 30	63	74
	# 50	43	52
	# 100	31	31
	# 200	23	21

Source: AECOM, 2010.

2.5 Conclusions and Recommendations

2.5.1 Chemical Investigation

Based on the results of the soil investigation, the chemical concentrations are well below the CHHSLs and RSLs for a residential land use, and the soil comprising the island in the Basin is not considered to be a potential threat to human health.

Lead, vanadium, and zinc concentrations exceed the Eco-SSLs for avian and/or mammalian wildlife and are considered to be potentially harmful to birds and/or mammals that are currently or may be present at the site in the future. This potential impact to wildlife can be mitigated by placing a minimum of 24 inches of clean fill above the soil removed from the existing Basin. In addition, it is recommended that the soils removed from the Basin and used as fill beneath the soccer fields are placed above the groundwater elevation to prevent potential leaching of pollutants.

2.5.2 Geotechnical Investigation

Based on the geotechnical results, the soil comprising the island in the Basin is considered to be suitable for use as fill for the proposed soccer fields. Test results show the island to be comprised of mainly silty sand. This material also shows a very low expansion index, which would not require any special design considerations.

3.0 Water Quality Investigation

An objective of the project includes a storm water quality evaluation to determine if the proposed soccer fields, pump station, and parking lot to be constructed at the Basin will create a reduction in water quality. This evaluation comprises a review of regulatory requirements and applicable water quality standards, an evaluation of water quality mitigation measures, numerical modeling and performance evaluation of mitigation measures, and a cost estimate of mitigation measures considered feasible for the project.

3.1 Regulatory Background

Storm water discharges are regulated by the USEPA through the Clean Water Act (CWA). The CWA includes a framework for regulating municipal and industrial storm water discharges under the National Pollutant Discharge Elimination System (NPDES). Section 402(p) of the CWA requires NPDES permits for storm water discharges from municipal separate storm sewer systems. Haster Basin is located within the City of Garden Grove, in Orange County, and is within the jurisdiction of California Regional Water Quality Control Board, Santa Ana Region (RWQCB). The RWQCB has ordered Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and Incorporated Cities of Orange County referred to hereinafter as the Phase I Permit (RWQCB, 2009).

The Phase I Permit is based on the following plans:

- Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) (RWQCB, 2008).
- California Toxics Rule (CTR) (EPA, 2000).
- California Toxics Rule Implementation Plan (State Water Resources Control Board [SWRCB], 2005).
- Ocean Plan (SWRCB, 2009a).
- Enclosed Bays and Estuaries Plan (SWRCB, 2009b).
- Thermal Plan (SWRCB, 1998).
- Draft 2007 Drainage Area Management Plan (DAMP) (Orange County/OCFCD/Cities of Orange County, 2006).
- 2009 Local Implementation Plan (LIP) (Orange County/OCFCD/Cities of Orange County, 2009).

Together, these plans define the requirements for maintaining and where possible, enhancing the water quality of lakes, streams, groundwater, tidal prisms, enclosed bays, estuaries, and oceans for the Santa Ana Region, and the site.

The RWQCB's intent of the Phase I Permit (RWQCB, 2009) is to require the implementation of best management practices (BMPs) to reduce to the maximum extent practicable, the discharge of pollutants in urban storm water to support the attainment of water quality standards. The water quality standards are based on water quality objectives defined for beneficial uses of the receiving waters.

3.2 Water Quality Standards

The applicable receiving waters of the Basin, as defined in the Basin Plan, are considered to be Outer Bolsa Bay, Huntington Harbor, Anaheim Bay National Wildlife Refuge, Anaheim Bay, and tidal prisms of flood control channels discharging to coastal or bay waters.

The applicable beneficial uses of these receiving waters as listed in the Basin Plan are:

- NAV – Navigation
- REC1 – Water Contact Recreation
- REC2 – Non-Water Contact Recreation
- COMM – Commercial and Sportfishing
- BIOL – Preservation of Biological Habitats of Special Significance
- WILD – Wildlife Habitat
- RARE – Rare, Threatened or Endangered Species
- SPWN – Spawning, Reproduction and Development
- MAR – Marine Habitat
- SHEL – Shellfish Harvesting
- EST – Estuarine Habitat

Both numeric and narrative water quality objectives are listed in the Basin Plan for these beneficial uses. Additional numeric water quality objectives are provided in the CTR for toxic chemicals. The waterbody type, as defined in Chapter 4, Water Quality Objectives, of the Basin Plan, considered to be applicable for the project is enclosed bays and estuaries, because the Basin drains to this waterbody type.

The Basin Plan lists numeric criteria for coliform bacteria, residual chlorine, and pH; and it lists narrative objectives for algae, color, floatables, oil and grease, dissolved oxygen, radioactivity, suspended and settleable solids, sulfides, surfactants (surface-active agents), taste and odor, temperature, toxic substances, and turbidity. The CTR lists numeric criteria for a number of chemicals including metals, phenols, VOCs, and pesticides. Numeric criteria are presented in Appendix C for applicable surface water analytical results. These results are further discussed in Section 3.5.

3.3 Section 303(D) Impaired Waterbodies and TMDLs

The current 2006 CWA Section 303(d) List for the Santa Ana Region was reviewed to determine if the site is listed as an impaired waterbody. The 303(d) List identifies receiving waters that are known to be impacted with certain pollutants, and the proposed completion date for a Total Maximum Daily Load (TMDL) directive to be implemented for each pollutant.

The Basin and East Garden Grove-Wintersburg Channel are not listed, however Huntington Harbor is listed for chlordane, copper, lead, nickel, pathogens, PCBs, and sediment toxicity. There is a proposed addition to the 303(d) List for East Garden Grove-Wintersburg Channel for ammonia. Based on this listing, a TMDL for ammonia is proposed to be implemented by 2021. There are no current TMDLs for the Basin or its receiving waters.

3.4 New Development/Significant Redevelopment Project Implications

The project is classified as a New Development/Significant Redevelopment project as described in the Phase I Permit (RWQCB, 2009), DAMP (Orange County/OCFCD/Cities of Orange County, 2006) and LIP (Orange County/OCFCD/Cities of Orange County, 2009). The following California Environmental Quality Act thresholds apply to this project and would be addressed in the Environmental Impact Report prepared for the project:

- Does the project violate any water quality standards or waste discharge requirements?
- Does the project create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?
- Does the project otherwise substantially degrade water quality?

3.5 Data Review

3.5.1 Water Quality Data

Urban runoff surface water sampling was previously performed at the site from December 2003 through June 2004. Samples were collected from two locations upstream of the Basin, and one location at the outfall of the Basin. The two upstream sampling points were located within the East Garden Grove-Wintersburg Channel (approximately 525 yards from the outfall into the Basin) and a closed section of the Oertley Storm Drain (approximately 400 yards from the outfall into the Basin). The sample location at the outfall of the Basin is on the grassy area immediately prior to the runoff entering the outfall drain, and was considered to be indicative of outfall conditions. The two upstream locations are not located immediately upstream of the Basin. Therefore, there is the potential that additional flow is entering the East Garden Grove-Wintersburg Channel and Oertley Storm Drain between the sample locations and the Basin, and these results may not be truly indicative of inflow conditions.

The County provided water laboratory results of chemical analyses performed on samples collected from the 2003-2004 sampling event. A total of 25 samples were collected from each of the three locations described above, on an approximate weekly basis, regardless of whether rain had fallen. The samples were analyzed for bacteria, OPPs, nutrients, total and dissolved metals, pH, DO, electrical conductivity (EC), water temperature, and hardness.

3.5.2 Water Quality Results

A comparison of the water quality results was performed to determine if there was a reduction in water quality between the influent and effluent points within the Basin. The water quality results were also compared to Water Quality Standards applicable to the project, as discussed previously in Section 3.2. A table that compares the results of water quality monitoring data to the Water Quality Standards is provided in Appendix C.

The results indicate that levels of pH, fecal coliform bacteria, and dissolved copper exceed the Water Quality Standards. It should be noted that the fecal coliform median result of 2,200 CFU (coliform units)/100-milliliters (mL) significantly exceeds the Standard of 14 MPN (most probable number)/100-mL. The results for silver are all undetected at the method detection limit of 2.0 micrograms per liter (µg/L), however, the criterion for silver is 1.9 µg/L. Therefore, it may be considered that the Water Quality Standard for silver is inconclusive, and further analysis at a lower detection limit is required to determine if the levels exceed the Standard.

The floatables, and oil and grease Water Quality Standards were also observed as being exceeded during the site inspection of January 12, 2010. Trash was observed in the shallow water and on the shoreline, and an oily film was observed on the water surface in several places around the Basin.

The water quality data provided for evaluation and modeling is not considered to be completely indicative of existing influent and effluent conditions, or the true performance of the Basin. The upstream locations are not directly upstream of influent into the Basin, and there is the potential for other runoff to contribute to the influent. Also, the effluent sample location is not immediately downstream of from the discharge point of the Basin, but rather from the Basin itself just before it enters the discharge structure. Only two of the 25 samples were collected while stormwater was being discharged from the Basin. There is the potential that the sampled water is stagnant and is not necessarily the same water that would discharge downstream to receiving waters during a rain event.

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